IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPELLANT(S):	Taniguchi *et al.*	CONFIRMATION NO.:	8149
SERIAL NO.:	10/717,985	GROUP NO.:	1733
FILING DATE:	November 20, 2003	EXAMINER:	Musser, Barbara J
TITLE:	Three-Dimensional Panels For a Game Ball and Related Methods		

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BRIEF ON APPEAL

This Appeal Brief is submitted in support of the appeal from the Examiner's January 26, 2006, final rejection of claims 1-5, 8-23 and 25-31 in the above-identified application. Appellants submit this Appeal Brief in furtherance of the Notice of Appeal filed April 26, 2006. Appellant enclose a check for $1520.00 to cover the fee for filing this Appeal Brief, and associated extension of time tees. The Commissioner and Director are hereby authorized to charge any additional fees that may be due, for any other purpose associated with this submission, or credit any overpayment, to Appellants' undersigned counsel's deposit account number 07-1700 with reference to docket number ADI-097.

REAL PARTY IN INTEREST

This application is assigned to adidas International Marketing B.V. and Molten Corporation. The assignment was recorded at Reel 015189, Frame 0625, on April 9, 2004. Accordingly, the real parties in interest are adidas International Marketing B.V. and Molten

Corporation.

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences pending in the above-identified application that will directly affect or will be directly affected by the Board's decision in the present appeal.

STATUS OF CLAIMS

The application as filed contained 32 claims. Claims 6 and 7 were withdrawn from consideration as being drawn to an unelected species of the elected invention under examination by an Amendment and Response filed November 8, 2005. Claims 24 and 32 were withdrawn from consideration as being drawn to an unelected invention by the Amendment and Response filed November 8, 2005. Claims 1-5, 8-23, and 25-31 are currently pending. All of the pending claims (i.e., claims 1-5, 8-23, and 25-31) have been rejected and are the subject of this appeal.

STATUS OF AMENDMENTS

No amendments have been filed subsequent to the Office action mailed on January 26, 2006.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 relates to a method of manufacturing a multi-layer outer panel for a game ball.[1] The method includes the steps of three-dimensionally forming a generally convex top layer comprising a first material and having an outer surface and an inner surface, the outer surface of the top layer dimensioned to substantially correspond to a section of a surface of the ball, and three-dimensionally forming at least one generally convex backing layer comprising a

[1] Specification, page 5, paragraph [0013].

second material and having an outer surface and an inner surface.[2] The inner surface of the top layer is connected to the outer surface of the at least one backing layer, thereby forming the outer panel.[3] Dependent claims 2-5, and 8-23 depend, either directly or indirectly, from independent claim 1, and contain further limitations to independent claim 1.

Independent claim 25 relates to a method for manufacturing a game ball.[4] The method includes the steps of providing an air-impermeable bladder having a substantially spherical shape, providing a plurality of multi-layer panels, each panel being formed in a generally convex shape prior to being interconnected with adjacent panels over the bladder, and interconnecting the edges of the panels, thereby forming an outer layer of the ball surrounding the bladder.[5] Each panel includes a generally convex top layer comprising a first material and having an outer surface and an inner surface, the outer surface of the top layer dimensioned to substantially correspond to a section of a surface of the ball, and at least one generally convex backing layer comprising a second material and having an outer surface and an inner surface, the outer surface of the at least one three-dimensional backing layer connected to the inner surface of the top layer.[6] Dependent claims 26-31 depend, either directly or indirectly, from independent claim 25, and contain further limitations to independent claim 25.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1, 9, 11, 12, 25, and 30 are rejected under 35 U.S.C. §102(b) as being anticipated by JP 1-265979 A. Claims 1, 8, 9, 18, 19, 22, 23, 25, and 29-31 are rejected under 35 U.S.C. §102(b)

[2] Specification, page 5, paragraph [0013], and pages 11-14, paragraphs [0030], [0035], and [0040].
[3] Specification, page 5, paragraph [0013].
[4] Specification, pages 6-7, paragraph [0018].
[5] Specification, pages 6-7, paragraph [0018], and pages 11-14, paragraphs [0030], [0035], and [0040].
[6] *Id.*

as being anticipated by U.S. Patent No. 6,206,795 to Ou (hereinafter "Ou"). Claims 2-4 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ou and further in view of U.S. Patent No. 5,624,517 to Giesen et al. (hereinafter "Giesen"). Claims 13 and 14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ou and further in view of U.S. Patent No. 4,157,424 to Boutle et al. (hereinafter "Boutle") and GB 1,095,969. Claims 20 and 21 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ou. Claims 5, 10, 26, and 27 are rejected under 35 U.S.C. §103(a) as being unpatentable over JP 1-265979 A. Claims 13-17 are rejected under 35 U.S.C. §103(a) as being unpatentable over JP 1-265979 A and further in view of Ou, Boutle, and GB 1,095,969.

ARGUMENT

Claims 1, 9, 11, 12, 25, and 30 are patentable under 35 U.S.C. §102(b) over JP 1-265979 A

Anticipation under 35 U.S.C. § 102 requires the disclosure in a single piece of prior art of each and every limitation of a claimed invention. *Apple Computer, Inc. v. Articulate Systems, Inc.*, 57 USPQ2d 1057, 1061 (Fed. Cir. 2000). Moreover, it is well established that the Examiner bears the initial burden of advancing a prima facie case of unpatentability. The Examiner has failed to make this showing. The claimed invention is simply not anticipated by JP 1-265979, and consequently, the rejection under § 102(b) is improper.

Independent claim 1 requires a multi-layer outer panel for a game ball manufactured by three-dimensionally forming a generally convex top layer and at least one generally convex backing layer. Independent claim 25 requires a game ball that includes providing a plurality of multi-layer panels, wherein each panel is formed in a generally convex shape prior to being

interconnected with adjacent panels over a substantially spherical bladder. Thus, the Appellants' claimed invention clearly contemplates manufacturing a game ball from multi-layer convex panels that are three-dimensionally formed to substantially correspond to a section of a surface of a ball prior to the assembly of the ball.

In contrast, JP 1-265979 discloses a ball including ***flat*** *flexible cover panels that* ***only*** *assume a convex shape once assembled to form a ball*. See, for example, FIGS. 3-5 of JP 1-265979. A translated copy of JP 1-265979 is included in the Evidence Appendix. As can be seen in the translation, JP 1-265979 is directed towards specific materials for forming a panel from a plurality of layers, and is silent on forming the resulting panels as generally convex layers that substantially correspond to a section of a surface of a ball.

For example, FIGS. 4 and 5 of JP 1-265979 clearly show a panel being formed from a mold (19, 20) having a substantially flat inner surface (surface of mold 20), with a plurality of indentations therein. The inner surface of the panel, corresponding to the inner surface of the mold (20), is not formed with a generally convex shape and will not "*substantially correspond to a section of a surface of a ball*," as required by Appellants' independent claims 1 and 25. Rather, the panel of JP 1-265979 is clearly formed to correspond to a flat surface, and will only take on a curved profile upon assembly onto a ball. In fact, the indentations molded into the inner surface of the panel of JP 1-265979 appear to be designed specifically to facilitate deformation of the molded flat panel to allow the panel to conform to the curved surface of the ball upon assembly on the ball.

The Examiner erroneously states that "*[s]ince the layers are intended to be attached to the surface of the ball, they substantially correspond to a section of the surface of the ball.*" See

final Office of January 26, 2006, page 2. As shown in FIGS. 4 and 5, the panels of JP 1-265979 are formed as substantially flat surfaces, and are only later deformed into a convex shape upon assembly on the ball. An affidavit from Shigeo Doi, a named inventor of the subject matter of JP 1-265979, is included in the Evidence Appendix. The affidavit states that the JP 1-265979 does not disclose three-dimensionally formed panels including generally convex layers that substantially correspond to a section of a surface of a ball. In contrast, Appellants' claims 1 and 25 expressly require that the panel be "***formed***" from generally convex layers that substantially correspond to a section of a surface of a ball.

Accordingly, JP 1-265979 fails to satisfy the requirements of §102(b), because it does not disclose each and every limitation of the claimed invention.

Claims 1, 8, 9, 18, 19, 22, 23, 25, and 29-31 are patentable under 35 U.S.C. §102(b) over Ou

As discussed above, the Appellants' claimed invention, as recited in independent claims 1 and 25, clearly contemplates manufacturing multi-layer convex panels for a game ball where the panels are three-dimensionally formed to substantially correspond to a section of a surface of a ball prior to the assembly of the ball.

In contrast, Ou is utterly silent with respect to the curvature of the cover panels upon formation. Ou focuses on multi-layer panels for basketballs configured "*so as to construct a basketball not only retaining the original characteristic of durable [sic], hardness and toughness but also containing new characteristics of being easier to grip and having better rebounding feature.*" See Ou, col. 2, lines 2-5. To that end, Ou's basketball includes a bladder carcass with a plurality of projection ribs integrally protruding to define eight leaf shape panel recesses

surrounded by the ribs. Each of the ribs is structured to form two extending inclined edges for each panel recess, so that each of the ribs has a slightly narrower root and a slightly wider top end. The basketball further includes eight leaf shaped cover panels having a shape of each of the panel recesses adapted to adhere in the eight panel recesses. See Ou, col. 2, lines 10-35. In the specification, Ou discloses in detail a variety of features of the panels, including specific configuration of the edges, the panels' outline, as well as overall thickness of the panels and its component layers, but fails to address their curvature upon formation, since there is none.

Further, Ou specifically discloses "*an additional foam layer attached to the conventional panel cover*" and states that "*the cover layer 41 can be structured as the conventional panel 12 as shown in FIG. 1*," where FIG. 1 represents the prior art. See Ou, column 1, line 67-column 2, line 1, and column 3, line 67 to column 4, line 1. As such, Ou specifically discloses that the panels are "***conventional panel covers***, i.e. flat panels.

The Examiner, nevertheless, disregarded a lack of teaching of convex panels in Ou's description and heavily relied on the reference's drawings, allegedly depicting convex structures. Ou, however, does not indicate that the panels shown in FIG. 4, 5, 6, and 7A-7D are depicted in their free state upon formation and before attachment thereof to the underlying supporting structure of the basketball. To the contrary, ***as a whole***, these drawings depict sectional views of the assembled basketball according to various embodiments of Ou's invention. See Ou, col. 2, lines 36-64 ("Brief Description of the Drawings" section).

For example, FIGS. 4 and 6 show "*partial sectional view*[*s*] ... *of a basketball*," while FIGS. 3 and 5 show "*partial exploded sectional view*[*s*] *of the basketball*." See Ou, column 2, lines 37-62. As such, these figures clearly show exploded views of the ball as assembled, and

there is nothing in Ou to indicate that the "*partial exploded sectional view of the basketball*" in any way represents the shape of the separate individual elements upon formation. As the panels of FIGS. 7A-7D are clearly shown in the same "*exploded*" configuration as in FIGS. 3 and 5, and as the figures of Ou merely depict conventional cover panels, these figures clearly show the shape of the elements as configured upon assembly, and do not show the shape of the elements when formed.

Accordingly, it is clearly improper for the Examiner to glean from this reference that the panels are manufactured by being formed generally convex, as recited in Appellants' claims, when there is simply no teaching of such in the reference.

Further, Ou addresses the problem wherein the edges of a panel fail to adhere to the surface of the ball. Specifically, Ou states that "*...if an additional foam layer is adhered to the conventional cover panel, another unsolvable problem appears, that is the edges of the foam layers fail to rigidly adhere with the vertical sides of the ribs 111 of the bladder carcass 11....*" See Ou, column 1, lines 58-63. Ou appears to solve this problem, at least in part, by providing the edges of the recesses with wedge shaped ribs, wherein the ribs are "*wedge shaped having two inwardly inclined sides to form two extending inclined edges for each panel recess, so that each of the ribs has a slightly narrower root and a slightly wider top end.*" See Ou, column 2, lines 17-21. In effect, the edges of each panel are pressed down into the overhangs produced by the inclined edges to fill the area produced under each overhang and provide better adherence between the panel edge and the ribs, thus reducing the problem of the panel edges delaminating from the bladder. See Ou, column 4, lines 10-38.

Appellants respectfully submit that the problem of panel edges pealing from the surface

of a ball will only be of relevance when flat panels are deformed to cover a curved surface, with the resulting stressed panels attempting to return to their unstressed, flat configuration. By providing a panel formed as a convex three-dimensional panel, which directly conforms to the surface of the ball, substantially no interior stresses will be produced by the assembled ball that would encourage the edges of the panels to delaminate from the surface of the ball. Appellants therefore submit that there is simply no need to provide a panel formed in the manner recited in the Appellants' invention with the inclined ribs of Ou, as the three-dimensionally formed panels of the Appellants' invention provide a solution to the problem of delamination in and of themselves. Thus, by requiring inclined ribs, Ou appears to be addressing a problem that would simply not exist if Ou were using convex panels formed to correspond with the surface of the ball. As such, Ou appears to teach directly away from the use of such panels.

Further, Appellants' independent claim 25 requires the edges of the multi-layer panels to be "*interconnected.*" In contrast, the panels of Ou do not interconnect, but are rather separated by the wedge shaped ridges.

Dependent claim 29 additionally requires that the "*outer layer comprises a self-supporting structure.*" Appellants respectfully submit that the panels of Ou cannot by definition form a self-supporting structure, at least because the panels of Ou do not even contact each other. Rather, the panels of Ou are supported only by the bladder and associated wedge shaped ridges, and without the bladder the panels do not support each other in any way.

Dependent claim 31 additionally requires that "*the ball is inflatable and a radius of the game ball in an inflated state exceeds a radius of curvature of each of the plurality of panels in an unloaded state.*" Appellants respectfully submit that Ou does not teach or suggest such a

structure, not only because Ou fails to teach or suggest forming a panel with any curvature, but also because Ou fails to teach or suggest a panel wherein the radius of curvature of the panels in an unloaded state is different from the radius of the ball in an inflated state. Ou is, rather, completely silent on the specific form of the panel when "*unloaded,*" and is further completely silent on the difference in curvature between any elements of the resulting ball whether the ball is inflated or not.

Accordingly, Ou fails to satisfy the requirements of §102(b), because it does not disclose each and every limitation of the claimed invention. In addition, Ou also appears to teach directly away from the Appellants' invention (as recited by independent claims 1 and 25).

Claims 2-4 constitute nonobvious subject matter and are patentable under 35 U.S.C. §103(a) over Ou and further in view of Giesen

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on Appellants disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). MPEP § 706.02(j).

In the present case, the Examiner has failed to find references that teach the limitations of claims 2-4. The Examiner, in other words, has not met the basic requirements of 35 U.S.C. §103(a).

Dependent claims 2-4 depend, either directly or indirectly, from independent claim 1. As discussed above, Ou does not teach all the limitations of independent claim 1. Specifically, Ou does not teach or suggest multi-layer convex panels for a game ball that are three-dimensionally formed to substantially correspond to a section of a surface of a ball prior to the assembly of the ball.

Giesen fails to cure the deficiencies of Ou. Giesen appears to describe a method of making a sanitary basin, such as a bath tub, sink basin, or shower pan including a basin carrier or body (2) and a liner shell (3) of another material. See Giesen, column 3, lines 39-46. As such, Giesen does not teach or suggest a method of creating a panel for game ball, and clearly fails to teach or suggest a multi-layer convex panel for a game ball that is three-dimensionally formed to substantially correspond to a section of a surface of a ball.

Accordingly, even if the cited references were combined as the Examiner proposes, they still would not teach the subject matter of claims 2-4. Nothing in the cited art teaches or even suggests a multi-layer convex panel for a game ball that is three-dimensionally formed to substantially correspond to a section of a surface of a ball.

Further, Appellants respectfully submit that there is simply no basis for combining the sanitary basin of Giesen with the basketball of Ou. Ou specifically describes the construction of a basketball that "*is more durable and has a softer feeling to reduce the painful [sic] during ball passing and shooting, especially suitable for children, training players and amateur players.*" See Ou, col. 2, lines 6-10. It would not have been obvious, even to one skilled in the art, to have applied methods disclosed in the forming of bath tubs and sinks to provide a basketball specifically designed to have a "*softer feeling*" that is "*suitable for children.*" Appellants

respectfully submit that the kitchen sink of Giesen does not cure the clear deficiencies of Ou.

As such, the Examiner's rejection fails to satisfy the requirements of 35 U.S.C. §103, because neither Ou or Giesen, alone or in proper combination, teach or suggest every element of the invention as claimed, and further because there is simply no suggestion or motivation to combine the teachings of Ou or Giesen in the manner required by the Examiner.

Claims 13 and 14 constitute nonobvious subject matter and are patentable under 35 U.S.C. §103(a) over Ou and further in view of Boutle and GB 1,095,969

The Examiner has failed to find references that teach the limitations of claims 13 and 14. The Examiner, in other words, has not met the basic requirements of 35 U.S.C. §103(a).

Claims 13 and 14 depend, either directly or indirectly, from independent claim 1. As discussed above, Ou does not teach all the limitations of independent claim 1. Specifically, Ou does not teach or suggest multi-layer convex panels for a game ball that are three-dimensionally formed to substantially correspond to a section of a surface of a ball prior to the assembly of the ball.

Boutle and GB 1,095,969 fail to cure the deficiencies of Ou. Boutle appears to describe a method of making porous materials, such as microporous plastic materials, and may be applicable to the production of hydrophilic microporous sheet material for various purposes, for example artificial leather for the lining of shoes. See Boutle, column 1, lines 13-14, and column 4, lines 34-37. GB 1,095,969 appears to describe an air inflated game ball having a molded elastomeric cover with simulated seams integrally formed on the cover surface. See GB 1,095,969, page 1, lines 71-81. Neither Boutle nor GB 1,095,969, alone or in combination, teach

or suggest a method of creating a panel for a game ball, or further creating a multi-layer convex panel for a game ball that is three-dimensionally formed to substantially correspond to a section of a surface of a ball.

Accordingly, even if the cited references were combined as the Examiner proposes, they still would not teach the subject matter of claims 13 and 14. Nothing in the cited art teaches or even suggests a multi-layer convex panel for a game ball that is three-dimensionally formed to substantially correspond to a section of a surface of a ball. As such, the Examiner's rejection fails to satisfy the requirements of 35 U.S.C. §103, because neither Ou, nor Boutle, nor GB 1,095,969, alone or in proper combination, teach or suggest every element of the invention as claimed.

Claims 20 and 21 constitute nonobvious subject matter and are patentable under 35 U.S.C. §103(a) over Ou

The Examiner has failed to find references that teach the limitations of claims 20 and 21. The Examiner, in other words, has not met the basic requirements of 35 U.S.C. §103(a).

Dependent claims 20 and 21 depend, either directly or indirectly, from independent claim 1. As discussed above, Ou does not teach all the limitations of independent claim 1. Specifically, Ou does not teach or suggest multi-layer convex panels for a game ball that are three-dimensionally formed to substantially correspond to a section of a surface of a ball prior to the assembly of the ball.

Appellants further submit that the figures of Ou do not render obvious the three-dimensional forming of convex panels for subsequent assembly onto a ball. General conclusions concerning what is "basic knowledge" or "common sense" to one of ordinary skill in the art

without specific factual findings and some concrete evidence in the record to support these findings will not support an obviousness rejection. See MPEP §2144.03B. To the extent that the Examiner might be relying on her own knowledge, Appellants observe that deficiencies of the cited references cannot be remedied by conclusory statements based on "general knowledge." See MPEP §2144.03; In Re Lee, 277 F.3d 1338, 1344 (Fed. Cir. 2002).

As such, at least for the reason discussed above, nothing in the cited art teaches or even suggests all the limitations of claims 20 and 21. Thus, the Examiner's rejection fails to satisfy the requirements of 35 U.S.C. §103, because Ou does not teach or suggest every element of the invention as claimed.

Claims 5, 10, 26, and 27 constitute nonobvious subject matter and are patentable under 35 U.S.C. §103(a) over JP 1-265979 A

The Examiner has failed to find references that teach the limitations of claims 5, 10, 26, and 27. The Examiner, in other words, has not met the basic requirements of 35 U.S.C. §103(a).

Dependent claims 5, 10, 26, and 27 depend, either directly or indirectly, from independent claims 1 and 25, respectively. As discussed above, JP 1-265979 does not teach all the limitations of independent claims 1 and 25. Specifically, JP 1-265979 does not teach or suggest multi-layer convex panels for a game ball that are three-dimensionally formed to substantially correspond to a section of a surface of a ball prior to the assembly of the ball. As such, at least for the reasons discussed above, nothing in the cited art teaches or even suggests all the limitations of claims 1 and 25, from which claims 5, 10, 26, and 27 depend. Thus, the Examiner's rejection fails to satisfy the requirements of 35 U.S.C. §103, because JP 1-265979 does not teach or suggest every element of the invention as claimed.

Dependent claim 10 additionally requires that "*the outer panel has a predetermined radius of curvature substantially matching a radius of the game ball.*" Appellants respectfully submit that JP 1-265979 does not teach or suggest such a structure, not only because JP 1-265979 fails to teach or suggest forming a panel with any radius of curvature, but also because JP 1-265979 fails to teach or suggest a panel wherein the radius of curvature of the outer layer has a radius of curvature substantially matching a radius of a game ball. As show in FIGS. 4 and 5 of JP 1-265979, the outer layer of JP 1-265979 comprises a substantially flat surface over much of its length, with a short curved portion at each end corresponding with the edges of the individual panel. As such, there is no single radius of curvature for the ball panel of JP 1-265979, and further, as the outer layer is constructed as substantially flat over much of its extent, there is clearly no radius of curvature substantially matching a radius of the game ball. In addition, the disclosure of JP 1-265979 appears to be completely silent on an outer layer of a ball panel being formed with a specific radius of curvature at all.

Claims 13-17 constitute nonobvious subject matter and are patentable under 35 U.S.C. §103(a) over JP 1-265979 A and further in view of Ou, Boutle, and GB 1,095,969

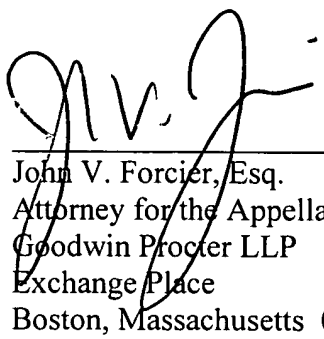
The Examiner has failed to find references which teach the limitations of claims 13-17. The Examiner, in other words, has not met even the basic requirements of 35 U.S.C. §103(a).

Dependent claims 13-17 depend, either directly or indirectly, from independent claim 1. As discussed above, neither JP 1-265979, nor Ou, nor Boutle nor GB 1,095,969, either alone or in proper combination, teaches all the limitations of independent claim 1. Specifically, neither JP 1-265979, nor Ou, nor Boutle nor GB 1,095,969, either alone or in proper combination,

teaches or suggests multi-layer convex panels for a game ball that are three-dimensionally formed to substantially correspond to a section of a surface of a ball prior to the assembly of the ball. As such, at least for the reasons discussed above, nothing in the cited art teaches or even suggests all the limitations of claims 13-17. Thus, the Examiner's rejection fails to satisfy the requirements of 35 U.S.C. §103, because neither JP 1-265979, nor Ou, nor Boutle, nor GB 1,095,969, alone or in proper combination, teach or suggest every element of the invention as claimed.

In view of the arguments above, Appellants respectfully submit that claims 1-5, 8-23, and 25-31 are patentable over the cited references. Appellants urge the Board of Patent Appeals and Interferences to reverse all of the Examiner's rejections as to all of the claims, and request allowance of claims 1-23 and 25-31 in due course.

Respectfully submitted,



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CLAIMS APPENDIX

1. A method of manufacturing a multi-layer outer panel for a game ball, the method comprising the steps of:

a. three-dimensionally forming a generally convex top layer comprising a first material and having an outer surface and an inner surface, the outer surface of the top layer dimensioned to substantially correspond to a section of a surface of the ball; and

b. three-dimensionally forming at least one generally convex backing layer comprising a second material and having an outer surface and an inner surface,

wherein the inner surface of the top layer is connected to the outer surface of the at least one backing layer, thereby forming the outer panel.

2. The method of claim 1, wherein step (b) is performed prior to step (a) and wherein, in step (a), the backing layer is used to three-dimensionally form the top layer.

3. The method of claim 2, wherein the top layer is three-dimensionally formed by at least one of deep drawing, vacuum forming, injection molding, dipping the at least one backing layer into the first material, and spraying the first material onto the at least one backing layer.

4. The method of claim 3, wherein the backing layer is used on a lower side of a stamp for deep drawing the top layer.

5. The method of claim 1, wherein the top layer is three-dimensionally formed by at least one of deep drawing, vacuum forming, injection molding, and spraying into a mold.

6. The method of claim 5, wherein step (a) is performed prior to step (b) and wherein, in step (b), the top layer is used to three-dimensionally form the backing layer.

7. The method of claim 6, wherein the top layer is at least partially used as a mold for three-dimensionally forming the backing layer.

8. The method of claim 1, wherein step (a) and step (b) are performed independently.

9. The method of claim 1, wherein the outer surface of the backing layer is dimensioned to substantially match the inner surface of the top layer.

10. The method of claim 1, wherein the outer panel has a predetermined radius of curvature substantially matching a radius of the game ball.

11. The method of claim 1, wherein the top layer and the at least one backing layer are connected by at least one of a chemical bond, a physical bond, and an adhesive.

12. The method of claim 11, wherein the outer panel is substantially free of mechanical stress at an interface between the top layer and the backing layer.

13. The method of claim 1, wherein the first material comprises a thermoplastic elastomer.

14. The method of claim 13, wherein the thermoplastic elastomer is selected from the group consisting of polyurethane, polyester, polyamide, polyolefin, polyethylene, polyvinyl chloride, and polybutadiene.

15. The method of claim 13, wherein the first material is substantially transparent.

16. The method of claim 15 further comprising, prior to step (a), providing at least one image on at least one of the inner surface and the outer surface of the first material and cutting the first material into a desired shape.

17. The method of claim 16, wherein the step of providing an image on at least one of the inner surface and the outer surface of the first material comprises depositing an imaging material onto the at least one surface of the first material.

18. The method of claim 1, wherein the second material comprises a foam material.

19. The method of claim 18, wherein the foam material is selected from the group consisting of polyurethane, ethylene vinyl acetate, and latex.

20. The method of claim 18, wherein the foam material is prevulcanized prior to the three-dimensional forming of the backing layer.

21. The method of claim 1, wherein the second material comprises a mesh material.

22. The method of claim 1, further comprising attaching a substrate layer to the inner surface of the backing layer.

23. The method of claim 22 wherein the substrate layer comprises a textile material.

24. (Cancelled)

25. A method for manufacturing a game ball, the method comprising the steps of:

providing an air-impermeable bladder having a substantially spherical shape;

providing a plurality of multi-layer panels, each panel being formed in a generally convex shape prior to being interconnected with adjacent panels over the bladder and comprising:

a generally convex top layer comprising a first material and having an outer surface and an inner surface, the outer surface of the top layer dimensioned to substantially correspond to a section of a surface of the ball, and

at least one generally convex backing layer comprising a second material and having an outer surface and an inner surface, the outer surface of the at least one three-dimensional backing layer connected to the inner surface of the top layer; and

interconnecting the edges of the panels, thereby forming an outer layer of the ball surrounding the bladder.

26. The method of claim 25, further comprising adhesively mounting the plurality of panels onto the bladder.

27. The method of claim 26, further comprising interposing a reinforcing layer between the plurality of panels and the bladder.

28. The method of claim 27, wherein the reinforcing layer comprises a flexible, generally spherical skeletal frame separate from and surrounding the bladder.

29. The method of claim 25, wherein the outer layer comprises a self-supporting structure.

30. The method of claim 25, wherein the air-impermeable bladder comprises an elastic material.

31. The method of claim 30, wherein the ball is inflatable and a radius of the game ball in an inflated state exceeds a radius of curvature of each of the plurality of panels in an unloaded state.

32. (Cancelled)

EVIDENCE APPENDIX

- Affidavit of Shigeo Doi (named inventor for Japanese Patent Application No. JP 1-265979)
- English translation of Japanese Patent Application No. JP 1-265979

AFFIDAVIT OF SHIGEO DOI

I, Shigeo Doi, declare and state that:

1. I am a named inventor of the claimed subject matter in U.S. Patent Application No. 10/717,985 (the '985 application), which is drawn to convex multi-layer panels for a game ball and related methods. According to one embodiment, a multi-layer outer panel for a ball game is provided including generally convex layers that are three-dimensionally formed to substantially correspond to a section of a surface of a ball.

2. I understand that certain claims pending in the '985 application have been rejected based on the subject matter of Japanese Application No. 63-092459, Publication No. 01-265979 (the '979 publication). Specifically, I understand that the Examiner has taken the position that "[*s*]*ince the layers are intended to be attached to the surface of a ball, they substantially correspond to a section of the surface of the ball.*" I disagree.

3. I am a named inventor of the subject matter of the '979 publication, which is drawn to a surface panel of a ball for sport, and its manufacture.

4. The '979 publication does not disclose three-dimensionally formed panels including generally convex layers that substantially correspond to a section of a surface of a ball.

All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true; and further these statements were made with the knowledge that willful false statements may jeopardize the validity of the pending application or any patent issuing thereon.

Date: 3 Oct 2006 By: Shigeo Doi

Shigeo Doi

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(54) Title of the invention ATHLETIC BALL SURFACE PANEL AND MANUFACTURING METHOD THEREOF

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SPECIFICATION

1. TITLE OF THE INVENTION

Athletic ball surface panel and manufacturing method thereof

2. SCOPE OF PATENT CLAIMS

(1) A surface panel for an athletic ball equipped with a single hollow, spherical, and elastic tube unit or a ball base body formed by adding a reinforcement layer to said tube and multiple surface panels that are attached to the entire surface of said ball base body, wherein said surface panel is composed of a panel main body made of a thermoplastic elastomer, a printed layer attached to the surface of said panel main body, a protective layer made of a transparent resin that is harder than said panel main body, which is attached such that it covers the surface of said panel main body and said printed layer, and a transparent cover layer made of a low-friction material formed on said protective layer.

(2) A surface panel for an athletic ball according to Claim 1, wherein said thermoplastic elastomer is selected from a group comprising polyvinyl chloride thermoplastic elastomers, polyester thermoplastic elastomers, urethane thermoplastic elastomers, olefin thermoplastic elastomers, and styrene thermoplastic elastomers, said hard resin is made of an acrylic resin or a urethane resin, and said low-friction material is made of wax.

(3) A manufacturing method for a surface panel for an athletic ball, wherein multiple panels are attached to the surface of an athletic ball, comprising:

a process in which a piece of stamping foil, which is formed by laminating a polyethylene terephthalate film substrate with a mold-releasing layer containing a low-friction material, a protective layer made of a transparent hard resin, a printed layer containing a dye, and an adhesive layer in the order described above, is arranged inside a metal mold having a cavity in the shape of the surface panel, and

a process in which a heat-softened thermoplastic elastomer is injected into said cavity and said printed layer is adhered to the surface of the molded surface panel through said adhesive layer, while said protective layer and a cover layer containing a low-friction material are simultaneously formed over the entire surface of said surface panel containing said printed layer.

(4) A manufacturing method for a surface panel for an athletic ball according to Claim 3, wherein said thermoplastic elastomer is selected from a group comprising polyvinyl chloride thermoplastic elastomers, polyester thermoplastic elastomers, urethane thermoplastic elastomers, olefin thermoplastic elastomers, and styrene thermoplastic elastomers, said hard resin is made of an acrylic resin or a urethane resin, and said low-friction material is made of wax.
(5) A manufacturing method for a surface panel for an athletic ball according to Claim 4, wherein said printed layer in said stamping foil is formed by photogravure.

3. DETAILED DESCRIPTION OF THE INVENTION

<INDUSTRIAL FIELD OF APPLICATION>

The present invention relates to a surface panel for an athletic ball and the manufacturing method thereof.

<PRIOR ART>

Conventionally, in athletic balls with an airtight structure such as a soccer ball, for example, a common structure has been one in which panels formed by cutting natural or synthetic leather into hexagons and pentagons are attached to the surface of the ball. In this type of athletic ball, the rims of the panels are ordinarily shaved very thinly and grooves are formed between adjacent panels when they are attached to the ball, resulting in the improvement of the ball's [flying] properties and flight distance. An example of a device that automatically performs such shaving processing (commonly called "Coba shaving") on the panel rims is the device disclosed in Japanese Examined Patent Application Publication S58-58399. Further, Japanese Examined Patent Application Publication S45-9619 is an example of a device that discloses transcription marks for printing on panels, and the structure disclosed in Japanese Examined Patent Application Publication S49-26068 is an example of a device in which the ball outer layer is molded with an injection molding method.

<PROBLEMS TO BE SOLVED BY THE INVENTION>

The following problems arise when the surface panels of an athletic ball are molded using the prior art described above.

(a) When panels for a soccer ball are molded with an injection molding method using a polyvinyl chloride thermoplastic elastomer, for example, the coefficient of friction of the surface is too large, which is inappropriate for the surface panels of the ball. Incidentally, the coefficient of friction of polyvinyl chloride thermoplastic elastomers is approximately 0.92–1.00, and the coefficient of friction suitable for a ball (soccer ball) is approximately 0.40–0.45. The coefficient of friction was measured with reference to ASTM D-1894-78.

(b) Panels molded as described above have poor moldability and dimensional stability, and the panels often deform into a waveform after they are molded. Because this type of panel is soft (hardness of approximately 60–85) and thin (approximately 1–3 mm), deformation that generates on the inside directly materializes as a change in shape.

(c) Panels made of polyvinyl chloride thermoplastic elastomers molded with an injection molding method lack luster and are poor in comparison to conventional balls made of natural or synthetic leather.

(d) When a polyvinyl chloride thermoplastic resin is injected into a metal mold cavity, substances such as plasticizers contained in the polyvinyl chloride evaporate and then cool, harden, and adhere to the metal mold surface. Therefore, the amount that adheres to the surface increases as molding is repeated, and this results in the problem that the entire surface of the metal mold cavity must be shaved once again. Such a procedure is normally performed with a frequency ranging from every few months to every six months.

The present invention solves all of these problems, and it realizes a panel that is optimal as the surface material of an athletic ball and the manufacturing method thereof.

<MEANS FOR SOLVING THE PROBLEM>

The first invention of the present invention is a surface panel for an athletic ball equipped with a single hollow, spherical, and elastic tube unit or a ball base body formed by adding a reinforcement layer to the tube and multiple surface panels that are attached to the entire surface of the ball base body, wherein the surface panel is composed of a panel main body made of a thermoplastic elastomer, a printed layer attached to the surface of the panel main body, a protective layer made of a transparent resin that is harder than the panel main body, which is attached such that it covers the surface of the panel main body and the printed layer, and a transparent cover layer made of a low-friction material formed on the protective layer.

The second invention of the present invention is a manufacturing method for a surface panel for an athletic ball, wherein multiple panels are attached to the surface of an athletic ball, comprising a process in which a piece of stamping foil, which is formed by laminating a polyethylene terephthalate film substrate with a mold-releasing layer containing a low-friction material, a protective layer made of a transparent hard resin, a printed layer containing a dye, and an adhesive layer in the order described above, is arranged inside a metal mold having a cavity in the shape of the surface panel, and a process in which a heat-softened thermoplastic elastomer is injected into the cavity and the printed layer is adhered to the surface of the molded surface panel through the adhesive layer, while the protective layer and a cover layer containing a low-friction material are simultaneously formed over the entire surface of the surface panel containing the printed layer.

<OPERATION>

The surface panel of the present invention is composed of panel main body made of a thermoplastic elastomer, a printed layer attached to the surface of the panel main body, a protective layer made of a transparent resin that is harder than the panel main body, which is attached such that it covers the surface of the panel main body and the printed layer, and a transparent cover layer made of a low-friction material formed on the protective layer. The protective layer gives the soft panel main body strength, and this has the effect of providing a feel similar to that of synthetic leather. The protective layer also makes the entire surface panel slightly hard, and this has the effect of facilitating the handling of the panel when it is attached to the surface of the ball base body. The cover layer reduces the coefficient of friction of the panel, and this has the effect of achieving a coefficient of friction that is optimal for the skin of the ball (approximately 0.40–0.45). The cover layer also generates a moderate amount of luster, and this has the effect of achieving a surface condition similar to that of natural or synthetic rubber.

<EXAMPLE OF EMBODIMENT>

Figures 1 and 2 show soccer ball 1 as an embodiment of an athletic ball, and surface panels 2—in other words, 12 pentagonal panels and 20 hexagonal panels—are arranged and attached to the surface of the ball such that their perimeters make contact with one another. The perimeters of surface panels 2 are formed with a sloping thickness, so grooves 3 are formed at the junctions of surface panels 2. Numeral 4 is a depression with a prescribed pattern such as a design, symbols, or characters formed on the surface of each surface panel 2, and printed layer 5 is formed inside this depression 4. Numeral 6 represents multiple protrusions formed at prescribed intervals on the back of surface panel 2, and these protrusions increase the flexibility and reduce the weight of surface panel 2. Surface panel 2 comprises panel main body 7, which is made of a polyvinyl chloride thermoplastic elastomer with a hardness level (JIS) of approximately 60–85, protective layer 8, which is attached to the surface of this panel main body 7 and is made of an acrylic resin that is harder than panel main body 7 such as polymethyl methacrylate, for example, and cover layer 9, which contains a low-friction material such as wax. Polyvinyl chloride thermoplastic elastomer materials that can be used to form panel main body 7 include Sumiflex (registered trademark) or Sumikon (registered trademark) (both made by Sumitomo Bakelite Co. (Ltd.)), Sunplane (registered trademark) (Mitsubishi Kasei Vinyl Co. (Ltd.)), and Alone Elastomer AE (registered trademark) or Alone NP (registered trademark) (both made by Toa Synthetic Chemical Industries (Ltd.)). The thickness of panel main body 7 is approximately 1–3 mm, and the total thickness of protective layer 8 and cover layer 9 is approximately 2–10 μ. A minimum quantity of a lubricant is immixed into the polyvinyl chloride thermoplastic elastomer that constitutes panel main body 7 in order to improve the adhesiveness with the ball main body. Numeral 10 is an intermediate rubber layer to which surface panel 2 is attached, 11 is a thread-wound reinforcement layer, and 12 is a rubber tube in which air is sealed with a prescribed internal pressure. Air is infused into this tube 12 through a valve not shown in the figures. Alternatively, a single tube unit made of a thermoplastic elastomer with a reinforcement function such as Hytrel (registered trademark), for example, can also be used as this ball base body.

Figure 3 shows the cross-sectional structure of stamping foil 13, which performs printing onto surface panel 2. Numeral 14 is a substrate made of a polyethylene terephthalate film with a thickness of approximately 35–50 μ, and 15 is a mold-releasing layer with a thickness of approximately 1 μ that is attached to this substrate 14. A low-friction material made of wax is applied to an acrylic resin, and the Tukon hardness is approximately 22. Numeral 8 is a protective layer with a thickness of approximately 1–10 μ as described above, which is formed on this mold-releasing layer 15, and this protective layer has a Tukon hardness of approximately 18–19. Numeral

5 is a printed layer with a thickness of approximately 40 μ that is formed into a prescribed pattern such as a design, symbols, or characters on protective layer 8, and it contains a dye with a prescribed color such as black, for example. A layer formed by photogravure would be suitable for printed layer 5. Specifically, a configuration in which the printed layer is formed from three layers, each with a thickness of approximately 1.5 μ—in other words, a configuration in which layered printing is performed three times to form a layer with a thickness of approximately 4.5 μ –is appropriate. Printed layer 5 formed by photogravure has the advantage that it is unlikely to peel after it is printed onto surface panel 2 due to its strong cohesive power. On the other hand, silk screen methods are also used for this type of printing onto stamping foil, but because they have the drawback that the printed layer is susceptible to peeling, they are not suitable for printing onto the surface panels of a ball. Numeral 17 is an adhesive layer formed such that it covers printed layer 5 and protective layer 8, and a urethane heat-sensitive adhesive can be used for this layer.

Next, the molding and simultaneous printing of surface panel 2 using stamping foil 13 will be described.

As shown in Figure 4, a pair of metal molds 19 and 20 having cavity 18 in the shape of surface panel 2 is prepared. An injection hole 21 is formed in one metal mold 20. Metal molds 19 and 20 are separated from one another, and stamping foil 13 is positioned between metal molds 19 and 20. At this time, substrate 14 of stamping foil 13 is positioned on the inside of cavity 18 of metal mold 19. Protrusions 22 are formed in cavity 18 corresponding to the printing portion, and printed layer 5 of stamping foil 13 is positioned opposite these protrusions 22. Surface texturing with minute concavities and convexities is performed on the inside surface of cavity 18 of this metal mold 19.

Therefore, the two metal molds 19 and 20 are fastened to one another in a superimposed manner. Nozzle 23 is placed in injection hole 21, and thermoplastic elastomer 24, which is heat-softened at approximately 200°C, is injected into cavity 18. Stamping foil 13 is pressed and adhered to cavity 18 of metal mold 19 by this injection pressure, and printed layer 5 is attached to panel main body 7, which is molded through adhesive layer 17. After molding, metal molds 19 and 20 are separated, and surface panel 2 is removed. Portions of protective layer 8 and mold-releasing layer 15 are attached to the surface of surface panel 2 such that they cover printed layer 5, and cover layer 9 is thus formed. When panel 2 is molded, the minute concavities and convexities formed on the surface of cavity 18 of metal mold 19 directly appear on the surface of surface panel 2 because stamping foil 13 is extremely thin. As a result, the surface of surface panel 2 is surface textured such that a leather design is formed.

With the surface panel 2 formed as described above, the dye of printed layer 5 passes through adhesive layer 17 and penetrates into panel main body 7, as shown in Figure 6, and this forms colored region 25 on panel main body 7. The depth of this colored region reached approximately 0.3 mm in approximately ten days after molding. Further, the direction of penetration coincides with the downward direction in the figure, and it was observed that penetration in the lateral direction was minimal. This means that the penetration of printing is minimal, which is significant for the present invention. The polyvinyl chloride thermoplastic elastomers used for the penetration of the dye were Sumikon (registered trademark) PMT2900 (Sumitomo Bakelite Co. (Ltd.)), and stamping foil made by the Reiko Co., Ltd.

Surface panels 2 formed in this way are attached to the surface of the ball base body with an adhesive, and the ball is then complete.

Figure 7 shows the coefficient of friction property resulting from a measurement method based on ASTM D-1894-78. Curve A shows the coefficients of friction of surface panel 2 of the embodiment of the present invention—in other words, the coefficient of friction of panel main body 7 and the surface of protective layer 16 of surface panel 2 formed on protective layer 16 and made of a polymethyl methacrylate resin. As a comparative example, curve B shows the coefficient of friction of a surface panel formed from only the panel main body 7 described above. Curve C shows the coefficient of friction properties of the surface of synthetic leather. It can be seen from the figure that the coefficient of friction in curve B [*sic*] is approximately 0.4–0.45, which is roughly equivalent to that of synthetic leather, while the coefficient of friction in curve B is approximately 0.92–1.00.

In the embodiment described above, panel main body 7 was described in an example using polyvinyl chloride thermoplastic elastomers, but in addition to these elastomers, polyester thermoplastic elastomers such as Hytrel (registered trademark) (made by Toray-DuPont (Ltd.)) or Pelprene (registered trademark) (made by Toyobo Co. (Ltd.)), urethane thermoplastic elastomers such as Pandex (registered trademark)

(made by Dainippon Ink and Chemicals (Inc.)) or Elastron (registered trademark) (made by [Elastron] Japan (Ltd.)), olefin thermoplastic elastomers such as Sumitomo TPE (made by Sumitomo Chemical Industries (Ltd.)) or Milastomer (registered trademark) (made by Mitsui Petrochemical Industries (Ltd.)), or styrene thermoplastic elastomers such as Tufprene (registered trademark) (made by the Asahi Kasei Corporation) or Solprene T (registered trademark) (made by Japan Elastomer (Ltd.)) can be used, and moderate coefficients of friction and durability can also be achieved with these materials. A feeling resembling that of natural rubber can be achieved by mixing pulverized natural leather into the thermoplastic elastomers described above. Further, addition to the acrylic resin described above, a urethane resin with excellent friction resistance can be used as the material for protective layer 8.

<EFFECT OF THE INVENTION>

The present invention yields the following effects.

(a) With the first invention, a cover layer containing a low-friction material is formed on the surface of the panel main body, so the coefficient of friction of the panel surface can be reduced, and a coefficient of friction that is optimal for an athletic ball can be achieved. In other words, because the amount of lubricant immixed in order to improve the adhesive strength with the ball base body is kept to a minimum, the coefficient of friction of the panel main body is as high as approximately 0.95, which is unsuitable for an athletic ball. Therefore, the coefficient of friction of the panel surface is reduced to approximately 0.40 by forming a cover layer containing a low-friction material on this panel surface, and this enables a coefficient of friction that resembles that of natural or synthetic rubber.

(b) With the second invention, stamping foil is positioned inside a metal mold cavity, while a polyethylene terephthalate film substrate is attached to the surface inside the cavity with minute concavities and convexities, and the molding materials make contact with this stamping foil, so in comparison to cases in which the molding materials make direct contact with the metal mold surface, the smooth surface properties of the polyethylene terephthalate film can be achieved, and this can give luster to the surface of the surface panel.

(c) As a result of the positioning of the stamping foil described above inside the cavity, it was confirmed that the percentages of contraction of the thermoplastic elastomers are equalized and the liquidity of the thermoplastic elastomers improves, so internal distortion is reduced and the ball becomes less susceptible to deformation.

(d) The part with the sloping thickness around the perimeter of the surface panel can be formed into a desired shape coinciding with the shape of the metal mold used for molding, so a complex Coba shaving device, which has been necessary in the past, becomes unnecessary.

(e) With the fifth invention, a printed layer that is less susceptible to peeling can be obtained by forming the printed layer using photogravure, which is optimal for printing on the surface panels of an athletic ball that endures intense impacts and frictional forces on its surface.

<BRIEF DESCRIPTION OF THE DRAWINGS>

Figure 1 is a front view showing the shape of the surface of a soccer ball. Figure 2 is a cross-sectional view through line A–A in Figure 1. Figure 3 is a cross-sectional view of a piece of stamping foil. Figures 4 and 5 are cross-sectional view showing metal molds. Figure 6 shows the relevant parts of the surface panel. Figure 7 is a property graph showing coefficients of friction.

1 ... soccer ball	2 ... surface panel
5 ... printed layer	6 ... protrusion
7 ... panel main body	9 ... cover layer
13 ... stamping foil	14 ... substrate
15 ... mold-releasing layer	16 ... protective layer
18 ... cavity	19, 20 ... metal molds

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[see source for figures]

FIGURE 1

1 soccer ball
2 surface panel

FIGURE 2

2 surface panel
3 groove
4 depression
5 printed layer
6 protrusion
7 panel main body
10 intermediate rubber layer
11 thread-wound reinforcement layer
12 tube

FIGURE 3

5 printed layer
13 stamping foil
14 substrate
15 mold-releasing layer
16 protective layer
17 adhesive layer

FIGURE 4

19 metal mold
20 metal mold
21 injection hole

FIGURE 5

FIGURE 6

8 protective layer
9 cover layer
17 adhesive layer
25 colored region

FIGURE 7

[x axis] Load (g)
[y axis] Coefficient of friction

RELATED PROCEEDINGS APPENDIX

NONE